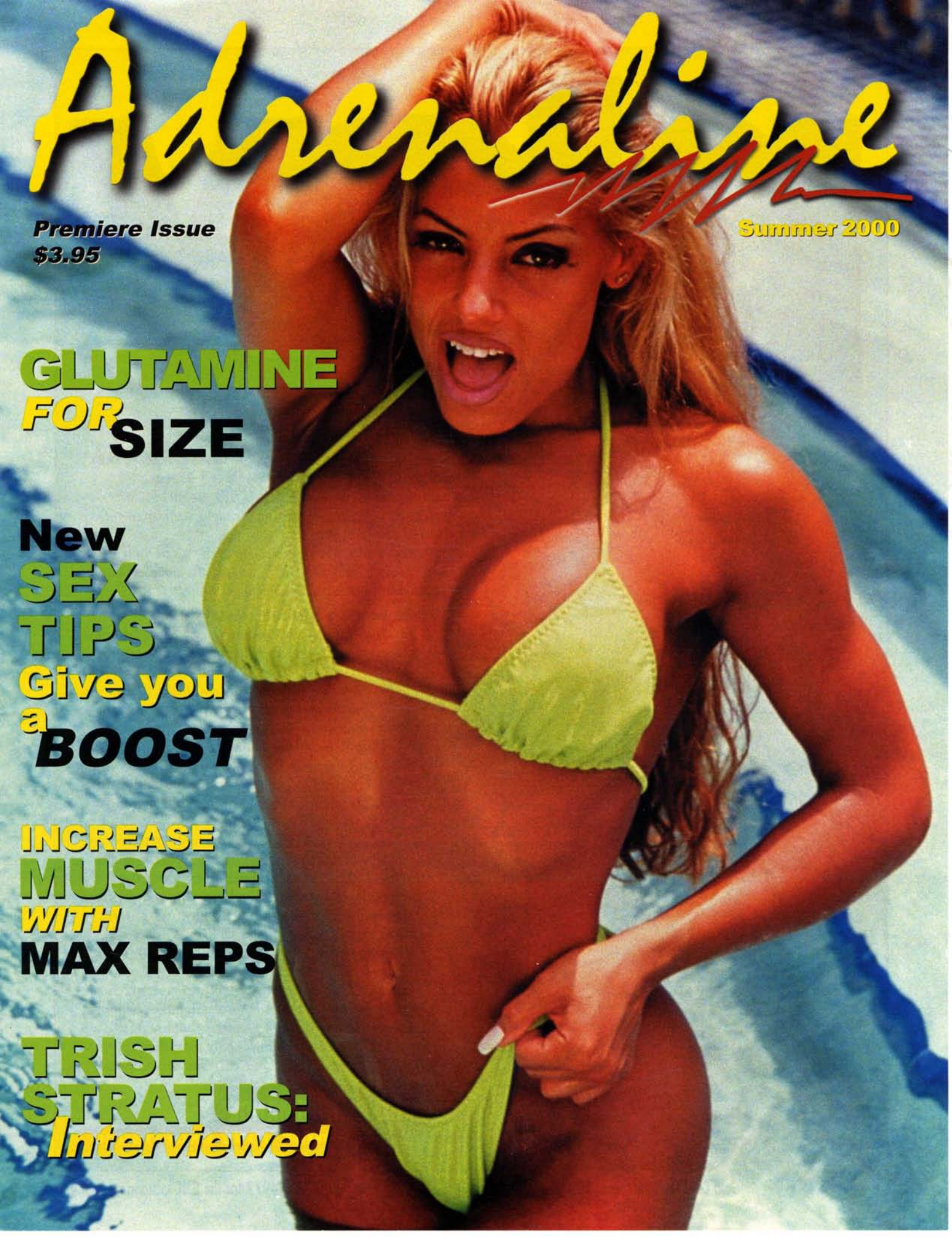
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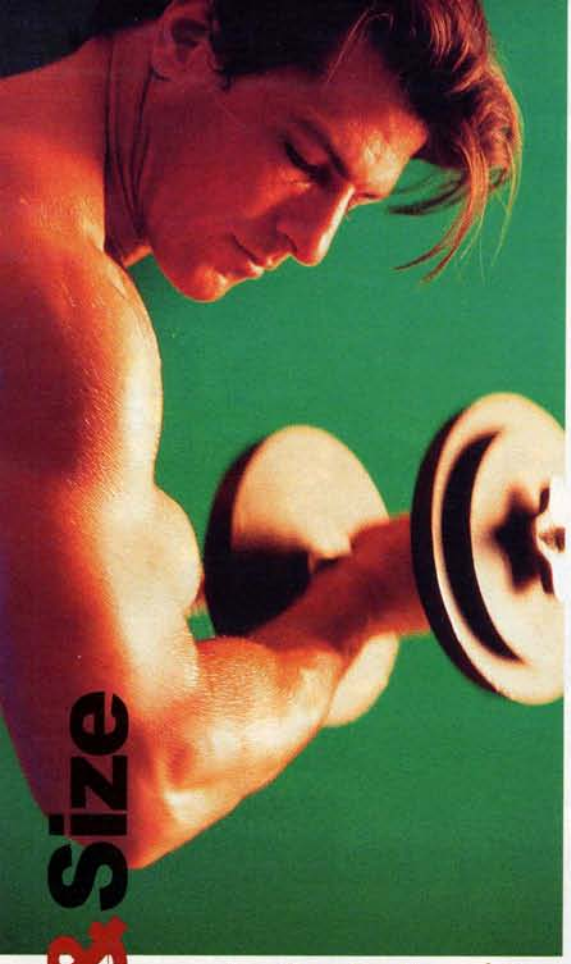


Strength & Size

High Intensity Approach

By Matt Brzycki

Is training to muscular failure necessary? If You Want the Best Gains Possible, it is.

For more than 50 years, a high level of effort has been recognized as being the most important factor — other than your genetics — in determining favorable results from strength training. Arthur Jones once defined intensity as "a percentage of momentary ability." In other words, intensity relates to the degree of the "inroads" — or amount of fatigue — made into a muscle at any given instant. When your muscles are fresh at the beginning of an exercise, your percentage of momentary ability is high . . . and your intensity (or effort) is obviously low. When your muscles are fatigued at the end of an exercise, your percentage of momentary ability is low . . . but now your intensity is high. (A percentage of momentary ability or intensity should not be confused with a percentage of maximum weight.)

Essentially, the harder you train, the better your response. In the weight room, a high level of intensity is characterized by performing each exercise to the point of muscular fatigue or "failure": when you've exhausted your muscles to the extent that you literally cannot perform any additional repetitions.

The Overload Principle

One of the most widely referenced principles in exercise physiology is the "Overload Principle" — a term first coined by Dr. Arthur Steinhaus in 1933. According to Dr. Roger Anoka — a biomechanist and author of the excellent college text "Neuromechanical Basis of Kinesiology" — the Overload Principle states, "To increase their size or functional ability, muscle fibers must be taxed toward their present capacity to respond." He adds: "This principle implies that there is a threshold point that must be exceeded before an adaptive response will occur."

The word "threshold" suggests that a minimum level of muscular fatigue must be produced in order to provide a stimulus for growth. Stated otherwise, your intensity of effort must be great enough to exceed this threshold level so that a sufficient amount of muscular fatigue is produced to trigger an adaptive response: muscular growth. Failure to surpass this threshold of muscular fatigue will result in little or no gains in muscular size or strength.

Given proper nourishment and an adequate amount of recovery between workouts, your muscles will adapt to these demands by increasing in size and strength. The extent to which this "compensatory adaptation" occurs then becomes a function of your inherited characteristics.

The Intensity Continuum

Clearly, failure to reach a certain level of fatigue will result in submaximal improvements in muscular size and strength. This concept is similar to aerobic conditioning where your effort must be great enough in order to achieve a cardiovascular effect. With aerobic conditioning, your level of effort is a function of your exercising heart rate. With strength training, your level of intensity is directly related to the amount of muscular fatigue that is produced. Unfortunately, your level of intensity — and the degree of muscular fatigue — is much harder to quantify during strength training.

No one knows precisely the minimum level of intensity necessary to surpass the "threshold" of fatigue and stimulate muscular growth. However, even if the minimum level is unknown, the most productive level of intensity can be determined by deductive reasoning. For the moment, let's suppose that a 90-percent level of intensity is the threshold for achieving maximal results. If so, how do we pinpoint 90-percent intensity . . . or 95-percent intensity . . . or any other level of intensity for that matter? Answer: You can't. (Again, a percentage of intensity should not be confused with a percentage of maximum weight.)

There are exactly two levels of intensity that can be determined easily and accurately. One level is 0-percent intensity or complete inactivity. Obviously, no intensity createsno stimulus and therefore produces no effect. The only other identifiable level is at the opposite end of the intensity continuum. That level is 100-percent intensity, which is characterized by a total, all-out effort for a prescribed amount of time. It is literally impossible to determine any other levels of intensity. Therefore, the only level of effort that is both productive and measurable is 100-percent intensity.

Do you have to train to muscle failure? Perhaps not. But how else will you know whether you surpassed the "threshold"?

Favourable Results

Simply, a submaximal effort will yield submaximal results. The fact that your results are directly related to your level of effort shouldn't come as much of a surprise. It's like anything else in life: How hard you work at your job, your studies, your practice sessions and even your relationships will largely determine your success at those endeavors. This also applies to your strength training. There's no question that training to muscular failure is an absolute requirement for achieving optimal gains in muscular size and strength.

Effort is a primary factor in the growth mechanism response. To shock your body into growth, you must give it reason to grow.

Does Training to Muscular Failure Teach Athletes to 'Fail' ?

In the first week of January 1996, I was one of six panelists who participated in a roundtable discussion during the National Strength and Conditioning Association (NSCA) 1996 Strength and Conditioning Conference for Football that was held in New Orleans, Louisiana. One of the panelists, Mike Stone, represented the traditional, NSCA-hyped training philosophy (i.e., explosive movements, periodization, multiple sets, high volume, free weight bias, emphasis on the Olympic-style weightlifting movements and their derivatives such as the power clean, and so on). Near the end of the roundtable discussion, he made this comment (or words to the effect): "Training your athletes to muscular failure is teaching them to fail." That's from a Ph.D. and the 1991 NSCA Sport Scientist of the Year! The verb "fail" has several meanings including "to fall short" and "to be unsuccessful." In order to prove whether or not the claim "Training your athletes to muscular failure is teaching them to fail" is accurate, we must first identify the teams/individuals who train to muscular failure and then see whether or not their performance did "fall short" or was "unsuccessful."

In 1997-98, nine teams in the NFL primarily trained their players to muscular failure: the Arizona Cardinals, Carolina Panthers, Cincinnati Bengals, Minnesota Vikings, New York Giants, Philadelphia Eagles, Pittsburgh Steelers, Tampa Bay Buccaneers, and Washington Redskins. During the regular season, these nine teams had a record of 45-42-1 against teams that DID NOT train to musculartailure which is three games over .500 and a winning percentage of .517. Or, stated otherwise, this means that the teams whose players DID NOT train to muscular failure were three games under .500 and a winning percentage of .483. In addition, four teams that trained their athletes to muscular failure made the playoffs (Pittsburgh, Tampa Bay, New York Giants, and Minnesota).

College football? At the Division I-A level in the 1997-98 season, five football programs who trained their players to muscular failure went to bowl games: Penn State, Michigan State, the University of Michigan, Stanford University and the University of Cincinnati. While this doesn't represent a large number of teams, it means that more than 60 Division I-A teams who didn't train to muscular failure didn't play in a bowl game during each of those two seasons.

College basketball? Three noteable universities train to muscular failure. The University of Kentucky went to three consecutive Final Fours from 1996-98. They won the title in 1996, finished second in 1997 and won the title again in 1998. The University of Michigan won the NCAA title in 1989. They also finished second in 1992 and 1993. The University of Cincinnati made the Final Four in 1992. Also, the United States Women's Basketball Team who trained to muscular failure on their way to the gold medal in the 1996 Olympics.

Ice Hockey? The Pittsburgh Penguins trained to failure and won two Stanley Cups in 1990-91 and 1991-92.

Wrestling? There are a large number of athletes who have been national champs or All-Americans in wrestling who trained to muscular failure. In 1988, Mark Coleman won the NCAA wrestling championship at 190 pounds for Ohio State. In addition, he won the tenth Ultimate Fighting Championship (UFC) — a no-holds-barred contest.

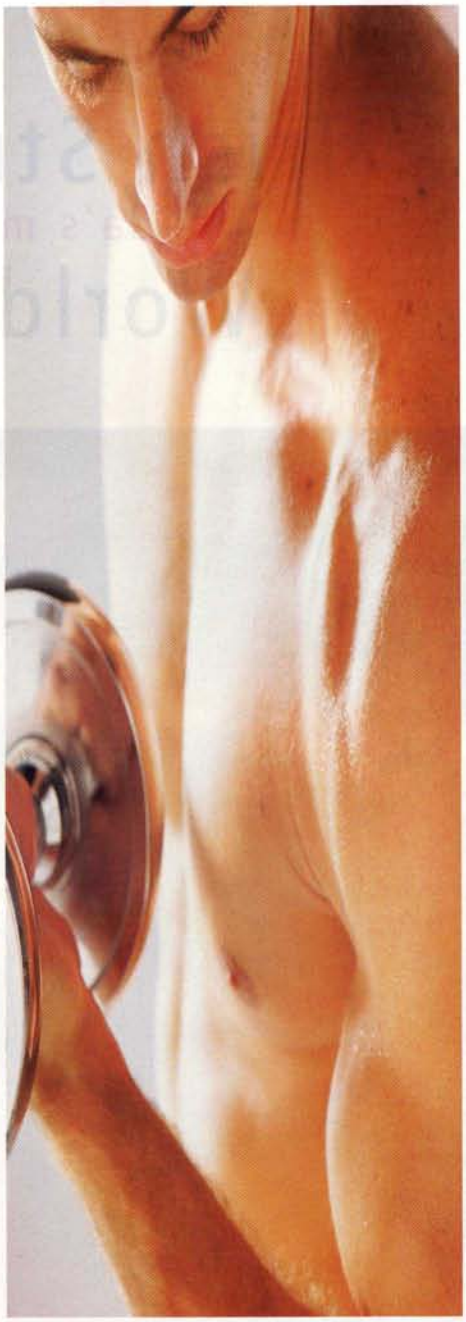
Baseball? In 1996, the University of Miami baseball team trained to muscular failure yet made it to finals of the College World Series, finishing second to Louisiana State University.

Volleyball? In 1997, two teams that trained to muscular failure were in the finals of the NCAA Women's Volleyball Championships: Stanford and Penn State. Stanford won the championship that year — their second national title in a row. The men's volleyball team at Stanford also won an NCAA championship in 1997, finishing the season with a record of 27-3.

Tennis? In 1996-97, both the men's and women's NCAA Championship were won by Stanford — it was the women's third straight national title. In 1997-98, Stanford repeated as the men's NCAA champion in tennis.

Swimming? In 1997-98, both the men's and women's NCAA Championship were won by Stanford.

So, are athletes who train to muscular failure being taught to fail? You tell me.



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